Stylistic variation in children's vowel production

Undergraduate Research Thesis

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by
Jill Deatherage

The Ohio State University
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Project Advisors: Dr. Robert Fox, Department of Speech and Hearing Science; Dr. Ewa Jacewicz, Department of Speech and Hearing Science

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Abstract

American English pronunciation patterns vary across the United States. It is well known that native speakers of American English speak with distinct accents so that people in the South pronounce certain sounds differently than people in the Midwest or Northeast. Possibly the most stereotyped feature of Southern American English is the monophthongization of the diphthong /ai/ to [a]. This feature can be observed to varying degrees across the American South. Although monophthongization represents an important social symbol in the South, its pervasiveness has begun to recede in recent generations. This sound change has been brought on by multiple factors including population mobility, education, and urbanization, which have promoted acceptance of a more standardized variety of American English, including diphthongal realizations of /ai/. This sound change has previously been studied primarily in adults, so it is largely unknown how children acquire forms typical of their speech community. The current study examines the change in progress toward [ai] in 20 children aged 8 to 12 from Western North Carolina in three different speaking styles: citation-form words, read sentences, and informal, unscripted talks. In addition to acoustic analysis, stylistic variation was rated by 20 central Ohio listeners (10 male, 10 female). Participants listened to individual words and rated the degree of perceived monophthongization on a 5-point scale. Results showed an increase in perceived monophthongization from citation forms, to read sentences, to informal talks. The vowel was also rated as more diphthongal in stressed words and in pre-voiceless consonant contexts and as more monophthongal in unstressed words and in pre-voiced consonant contexts. Compared to girls, boys had a higher occurrence of the monophthongal variants and lower occurrence of the full diphthongs across all production types. These findings provide evidence for the sound change in progress in children in this speech community and demonstrate children's awareness of how speech style conveys social information.

Chapter 1

Introduction

Monophthongization of the diphthong /ai/ to [a] or [a:] is perhaps the most widely stereotyped feature of Southern American English (SAE) (Bernstein, 2006; Labov et al., 2006). This salient feature can be heard with various degrees of strength in the broad American South stretching from North Carolina in the east to Texas in the west, and from the Ohio River in the north to Florida in the south. Indeed, the wide-ranging American South in the U.S. is currently the most populous region approaching 115 million (37% of all residents) living in 16 states. Although monophthongization of /ai/ represents an important social symbol for many generations of Southerners, its pervasiveness has started to fade among young adults and children. This recent change is the result of multiple factors including population mobility, education, and urbanization, which have promoted accommodation to and acceptance of a more standardized, less stigmatized variety of American English, including diphthongal realizations of /ai/.

The current study examines variation in the production of /ai/ in children, asking whether the children in the South still learn to recognize and utilize features of their regional dialect amid strong influences from General American English. The aim is to better understand the appearance of socio-indexical patterns in older children's speech and how these patterns are altered by their speaking style. The question asked in the current study pertains to a broader problem of the relation between style shifting and sound change in progress in a given speech community. Consider the following scenario in Labov (2013, p. 249): "When a lower middle class boy learns that working class speakers use a higher frequency of [ɪn] for (ing) than he does, how does this affect his interpretation of the fact that his mother uses more [ɪn] when she is

warm and intimate with him than when she is scolding him?" This example illustrates children's exposure to adjustment of the use of local forms in casual daily interactions. A style-shifting experience such as this will lead to children's accumulated knowledge of stylistic variation in speech and to the acquisition of community norms. As their social experience broadens, children's interpretation of stylistic usage will then underlie their rejection of certain local norms as old-fashioned and not widely used, and their acceptance of more "modern" features such as diphthongal realizations of /ai/.

In this study, we examine how children's knowledge of socio-phonetic patterns of /ai/ production is reflected in their speaking style. Style shifting within a typical sociolinguistic interview is an effective way to elicit systematic variation in pronunciation patterns. There is evidence that the more formal the style, the greater the frequency of standardized (or prestigious) forms (Labov, 2006). The shift of speaking styles with increasing formality is typically achieved by varying experimental tasks to obtain speech samples in spontaneous conversations, read sentences, and in a word list, respectively. Using this well-established paradigm, we expect to elicit variable productions of /ai/ in children's speech, predicting that the diphthongal variants will occur more often in formal than in spontaneous productions. In particular, if the children have acquired understanding of the socio-phonetic variation, we expect them to produce the diphthongal variants more often in single words, followed by read sentences and spontaneous conversations, respectively.

The diphthongal variants are also more likely to occur in stressed (or emphasized) words than in unstressed words, whether produced in a more formal speech such as in read sentences or in conversational speech. This is because stressed words require more careful and slower pronunciation and perhaps a greater awareness of social aspects of stylistic variation since

emphasized words “stand out” and typically denote semantic focus. Should this be the case, the variable realizations of /ai/ as a function of speaking style would demonstrate children’s ability to use both monophthongal and diphthongal variants in distinct ways. Accordingly, this “dual mode” of production will be interpreted as children’s systematic divergence from the established norms in their speech community, indicating sound change in progress.

The children selected for the study were born and raised in Western North Carolina (NC). This dialect area is a part of the Inland South and is considered the core of the most advanced features of SAE (Labov et al., 2006). Of relevance to the current study is that the pronunciation of /ai/ in SAE varies as a function of voicing of the consonant that follows. Historically, the monophthongal variant occurred only in the pre-voiced context (PRIZE) and then spread to the pre-voiceless context (PRICE) (Thomas, 2001). While Southerners produce the monophthongal /ai/ before voiced consonants all across the South, pre-voiceless monophthongization is more restricted and appears to be used primarily by speakers from the Inland South (Labov et al., 2006; Wolfram and Christian, 1976). This study examines the production of /ai/ in both pre-voiced and pre-voiceless contexts to determine if children are aware of this pattern in their speech community and whether they still produce the advanced monophthongal variants in pre-voiceless contexts.

Recent socio-phonetic work brought to light patterns of vowel production in two generations of adult speakers from this particular speech community (Jacewicz et al., 2011; Fox and Jacewicz, 2009). As was evident, adults in this region do produce the monophthongal variety of /ai/ and there was no significant acoustic difference between the monophthong in pre-voiced and pre-voiceless contexts (Fox and Jacewicz, 2009). Thus, children in this community are likely to hear the monophthongal /ai/ in both consonant environments in the speech of people who, age-

wise, could be their parents and grandparents. We can thus predict that, if /ai/-monophthongization is receding in young populations, the diphthongal variant will be more prevalent in pre-voiceless contexts than in pre-voiced contexts because the former are associated with strictly local pronunciation patterns.

There is evidence from other American dialects that young adults and children are shifting away from strong regional features. For example, r-less pronunciation in New Hampshire, which is considered the most prominent dialect feature of this region, is currently fading in younger generations. An interesting observation from that region was reported in Stanford et al. (2012, p. 160): "A 12-year-old boy on the New Hampshire side of the border (Lebanon, NH) mentioned that he has observed some teachers who say 'pahk the cah.' When asked if any if his classmates talk that way, he answered, 'No! It sounds old-fashioned [laughing]." Thus, among the young speakers, the traditional eastern nonrhotic feature may be associated with "backwoods" or "old-timers" and is not a representative of a more diverse and modern lifestyle. Similarly, we can expect that the children in the Western North Carolina community may be sensing that the monophthongal use of the /ai/ in pre-voiceless contexts is very local and that younger people do not talk that way anymore.

Differences based on speaker gender have also been reported for the use of the monophthongal /ai/ in the South. For example, investigating the /ai/-variation among young speakers in Central Texas, Jung (2011) found that young adult females had an overwhelmingly higher rate of diphthongal realizations than males. This outcome is consistent with the view that women, using more prestigious forms than males (Coats, 1993), tend to be leaders of language change (Wolfram and Schilling-Estes, 2006). The current study will bear on this issue by including both girls and boys, which will contribute new evidence from children's speech.

Chapter 2

Methodology

1. Participants

a. Speakers

Twenty children ages 8-12 years participated, 10 boys (M = 10.5 y.o., SD = 1.3) and 10 girls (M = 11.0 y.o., SD = 1.2). All children were born and raised in the Inland South dialect region in Western North Carolina (the Cullowhee area in the Appalachian Mountains). All participants were students who attended local elementary schools. Each child spoke the local variety of Southern American English as verified by the research team. All children were fluent readers.

b. Listeners

Twenty-two adults ages 19-31 years participated (M = 21.7 y.o., SD = 2.6). All were long-term residents of Central Ohio who had not left the area for long periods of time. All participants had at least two years of college education and had no reported hearing loss.

2. Experimental stimuli

a. Production of /ai/ *in read speech*

To elicit variations in the production of /ai/, speech samples of both isolated words and read sentences were used. The speech materials were constructed and collected for a larger project and only a subset of the data relating to the diphthong /ai/ is presented here. In the first task, each child read a word in the hVd-frame, containing one of the 14 American English vowels. The words were presented in random order, one at a time, on a computer monitor. Three repetitions of the word *hide* from each child were included in this study for a

total of 60 tokens from all speakers from the isolated word context. This task was intended to elicit the most careful production type, representing a formal speaking style.

In the second task, each child read 120 sentence sets in which the target word was produced with variable emphasis. To elicit the variation, a contrastive stress paradigm was used so that each target word containing the /ai/ vowel, in this case either "bites" or "bides", occurred in one of the five different positions in a sentence as in the following examples: *JANE thinks the small bites are deep. No, SUE thinks the small **bites** are deep* (The capitalized word in the second sentence was produced with more emphasis and the bolded target word was produced with less emphasis). *Sue thinks the small CUTS are deep. No, Sue thinks the small **BITES** are deep* (The capitalized word in the second sentence also carried the main sentence stress and was thus produced with greater emphasis). A complete list of sentences used in the experiment can be found in Appendix A. One sentence set was presented at a time to the child on a computer monitor. The child first read the set silently and then recorded it by speaking into a head-mounted microphone. Only the second sentence in the set was analyzed because children's productions tended to be less fluent, and therefore less natural, in the first sentence. Each child recorded 6 productions of /ai/ in a pre-voiceless bVt-context ("bites") and 6 productions in a pre-voiced bVd-context ("bides") for a total of 120 productions of each voicing context, and a total of 240 tokens from read sentences, from all participants. This structured reading task intended to elicit variable productions of the /ai/ vowel in a less formal style. The experiment was controlled by a custom MATLAB program.

b. Production of /ai/ *in spontaneous talks*

In order to elicit a more casual production style from the children, each child was asked to tell a story about their hobbies, pets, families, friends, and school events. Ten examples of the child's /ai/ production were taken from each talk, 5 stressed (if possible, carrying primary

sentence stress) and 5 unstressed, for a total of 200 words from all participants. The tokens were not constrained to a specific consonantal context due to a great variability of speech material obtained from all children. However, the postvocalic consonant choices were controlled to ensure that exemplars of the /ai/ vowel followed by both voiced and a voiceless consonant were obtained from each child. If not enough words ending in a consonant could be found in a talk, open syllable words such as "my" or "shy" were selected instead. This task represented the most casual speaking context of all three tasks. A complete list of target words and phrases from which these words were edited can be found in Appendix B.

c. *Acoustic analysis of the experimental tokens*

The vowels in the stimulus set from read speech (including the isolated /hVd/-words and the words "bites" and "bides" in sentences) were analyzed acoustically. Formant trajectories for /ai/ were sampled at 5 equidistant time points over the course of the vowel's duration (at the 20-35-50-65-80%-point) to estimate the nature and amount of diphthongal change. Overall, girls' vowels had more spectral change (shown in Fig. 2.1) than boys' vowels (shown in Fig. 2.2). This indicates that, on average, girls had more diphthongal realizations of /ai/ and boys' vowels were comparatively more monophthongal. It is also of note that stressed vowels were more diphthongal than unstressed vowels and vowels in pre-voiceless contexts were more diphthongal than vowels in pre-voiced contexts. These production patterns are thus in line with the predicted stylistic variation in the pronunciation of the /ai/-vowel in read speech.

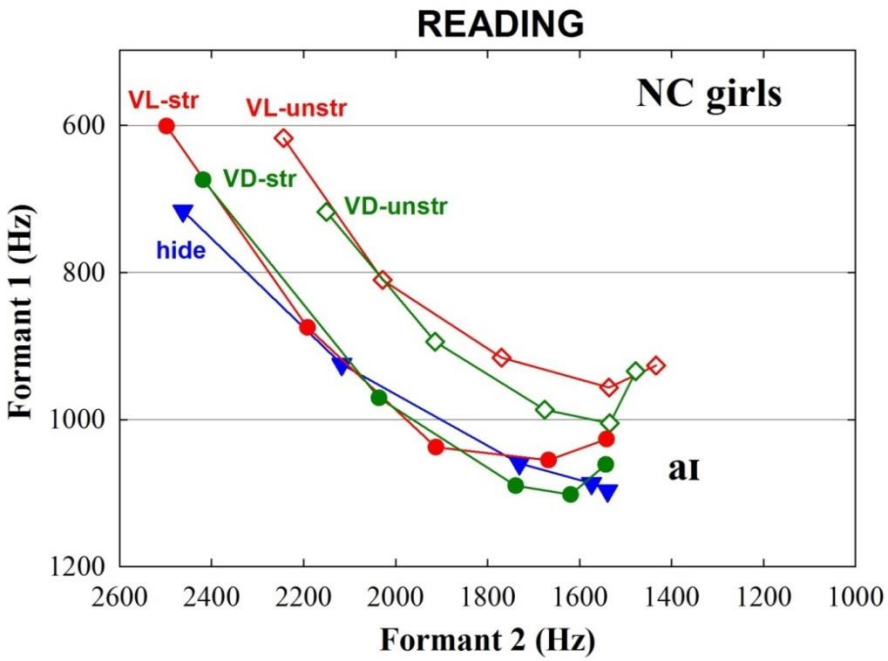

Figure 2.1. Mean F1 and F2 frequencies in isolated words and in read sentences for the girls.

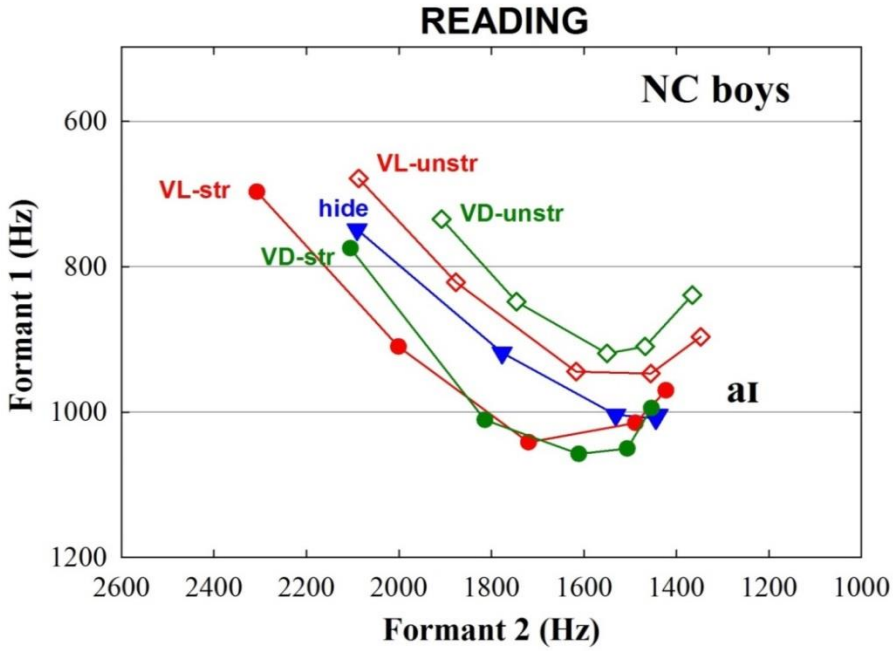

Figure 2.2. Mean F1 and F2 frequencies in isolated words and in read sentences for the boys.

3. Perception experiment

Prior to the perception task, each participant signed a consent form and filled out a brief background questionnaire. Each participant then listened to recorded verbal instructions which explained the task. A paper copy of the instructions was also made available. In case there were questions, the participants were also given a brief explanation of dialects and the difference between a monophthong and a diphthong, as well as a description of the overall procedure of the task. Participants were asked to rate the speech tokens produced by the children from North Carolina on a continuum of very diphthongal (1) to very monophthongal (5). In order to familiarize the participants with the task, a demonstration which consisted of synthetic version of the /ai/-tokens for each rating from 1 to 5 was presented to each participant prior to the task. Examples of synthesized tokens representing the five production types are shown in Fig. 2.3.

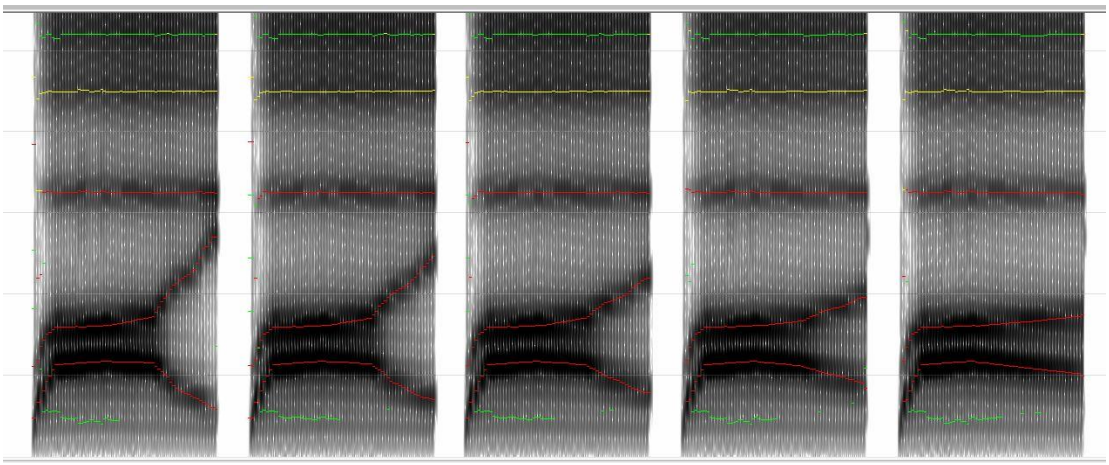

Figure 2.3. Synthetic examples of /ai/ on a scale from 1 (very diphthongal) to 5 (very monophthongal).

A practice round of 24 tokens was also presented with an opportunity for questions and feedback from the experimenter. The participant was seated in a sound-attenuating booth in front of a computer monitor throughout the experiment. One token was presented at a time over headphones, in two sets of 250 tokens. All target words were amplitude equalized and presented in random order. For each token presented, the participant chose the rating on a scale from 1 to 5, which they thought was the best characterization of the token they heard. The task was controlled and answers were recorded by a custom MATLAB program.

Chapter 3

Results

1. Inter-judge reliability

Intra-class correlation (ICC) analysis was used to assess the inter-judge reliability of rating scores. Based on the initial results, 5 listeners were excluded due to numerous disagreements. The final ICC was calculated for n = 17 listeners. ICC coefficient for average measures was strong and statistically significant (r = .946, p < 001), indicating high inter-judge reliability. ICC coefficient for single measures (i.e., for one, typical, single rater) was also significant (r = .523, p < 001). This analysis established high agreement among the 17 listeners, whose responses were further analyzed for the effects of the variables of interest.

2. Read speech

An initial inspection of ratings for the citation-form words *hide* indicated that 3 out of 20 children, 2 boys and 1 girl, produced the /ai/ vowel exclusively as a monophthong. Given that the single-word task was intended to elicit the most formal speaking style, the monophthongal productions in this task suggested that the children had only one representation of /ai/, (i.e., a monophthong) and were therefore unlikely to shift styles in less formal types of production. These three children were thus excluded from further analyses and only the results for 17 children, 8 boys and 9 girls, were assessed statistically.

First, an independent *t*-test showed no significant difference between boys and girls for the production of /ai/ in isolated words (*hide)*, [t(8.8) = 2.1, p = .065], which was rated as mostly a diphthong (/ai/). However, there were significant differences between boys and girls in words *bites* and *bides* in read sentences, as shown in Table 3.1.

Table 3.1. Results of independent *t*-tests for the differences between boys and girls for all stress and voicing combinations in words produced in read sentences. VL = voiceless, VD = voiced, str = stressed, unstr = unstressed.

Context	***t***	**df**	***p*-value**
VL-str (bites)	2.6	15	.021
VL-unstr (bites)	2.5	9.2	.034
VD-str (bides)	2.7	15	.018
VD-unstr (bides)	2.4	15	.030

Mean ratings of children's productions of the /ai/ vowel in read speech, including isolated words (*hide*) and words in a sentential context (*bites, bides*) are displayed in Fig. 3.1. As can be seen, the /ai/ was rated as most diphthongal in isolated words and the differences between boys and girls were very small (and non-significant). However, the vowel was rated as more monophthongal in pre-voiced context than in pre-voiceless contexts. Also, the ratings as monophthongal were always higher for unstressed than for stressed vowels. For all voicing and stress combinations, vowels produced by boys were rated as more monophthongal than vowels produced by girls.

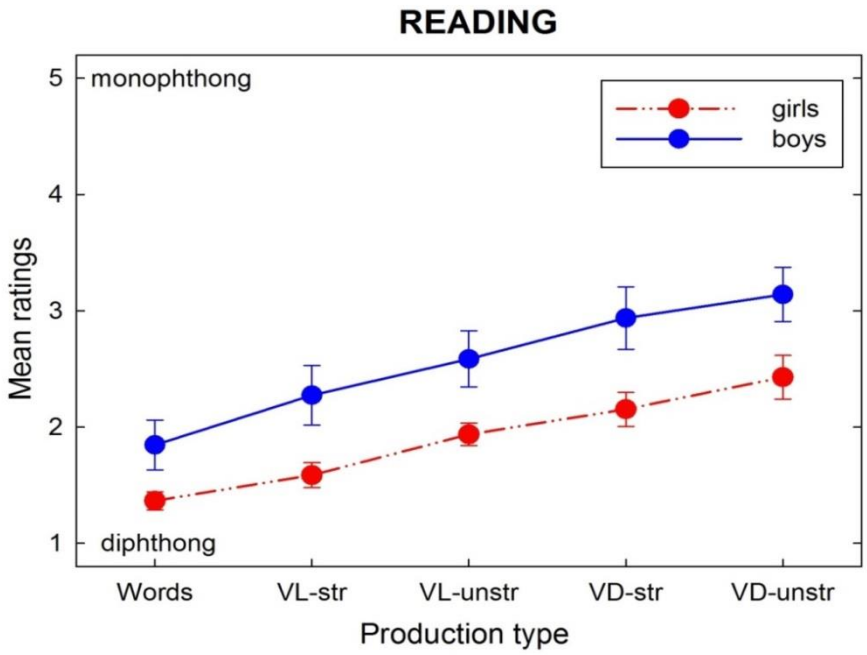

Figure 3.1. Mean ratings of /ai/ in read speech. Shown are ratings for single words (hide) and for words in sentences as a function of consonant voicing and stress.

The ratings for sentences were further analyzed using a repeated-measures analysis of variance (ANOVA) with the within-subject factors voicing (voiceless, voiced) and stress (stressed, unstressed) and between-subject factor speaker sex (male, female). Interactions, if significant, were subsequently explored with post hoc *t*-tests. All analyses were conducted in IBM SPSS Statistics v. 21 (2012).

All three main effects were significant. There was a significant main effect of voicing, illustrated in Fig. 3.2: Vowels in pre-voiceless contexts (VL) were significantly more diphthongal than vowels in pre-voiced contexts (VD), [$F(1,15) = 42.86$, $p < .001$]. There was also a significant main effect of stress, illustrated in Fig. 3.3: Stressed vowels were significantly more diphthongal than unstressed vowels [$F(1, 15) = 6.79$, $p = .020$].

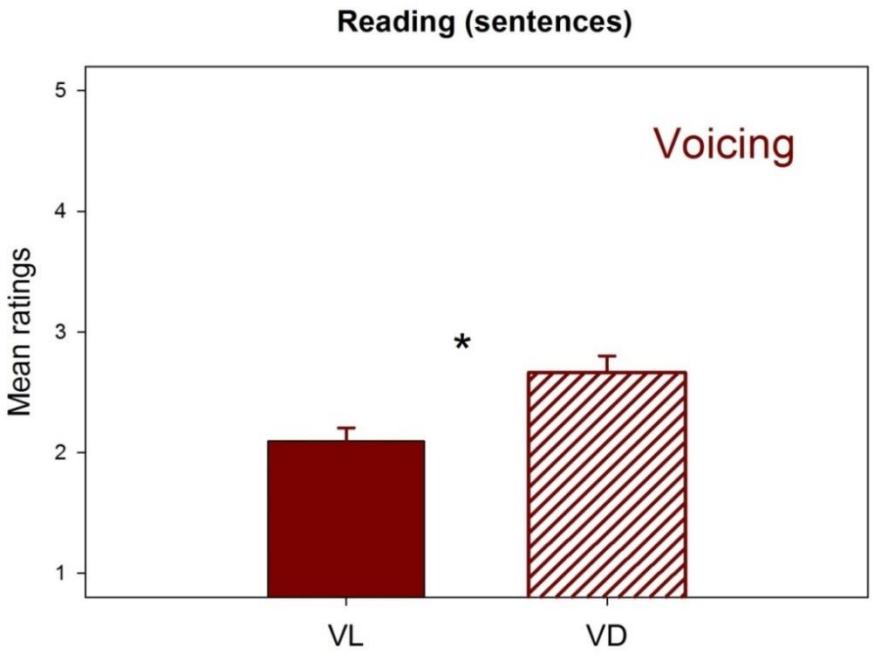

Figure 3.2. Mean ratings of /ai/ in read sentences as a function of consonant voicing.

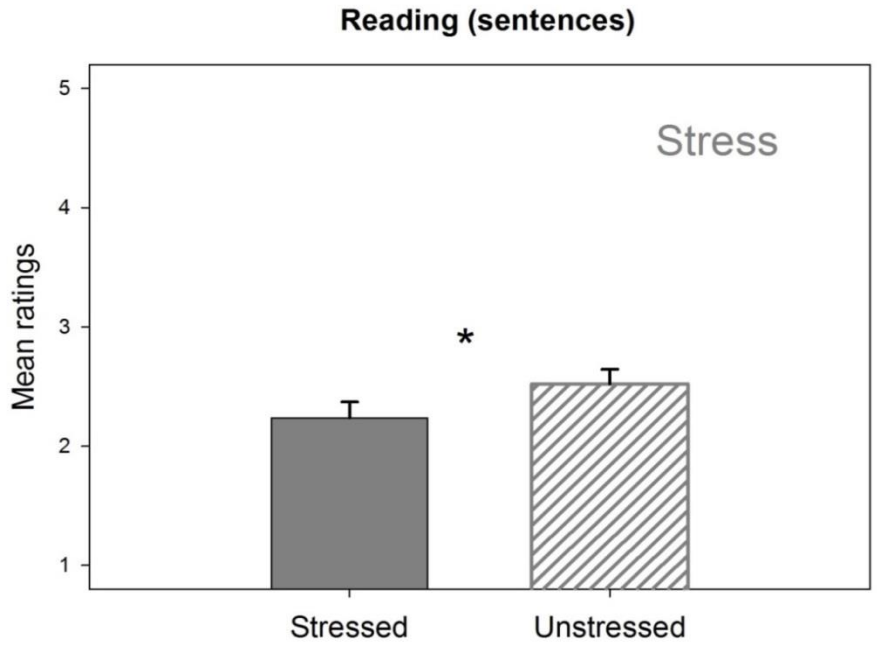

Figure 3.3. Mean ratings of /ai/ in read sentences as a function of stress.

Speaker sex was also significant as shown in Fig. 3.4: Vowels produced by girls were significantly more diphthongal than vowels produced by boys, [$F(1, 15) = 9.42$, $p = .008$]. There were no significant interactions.

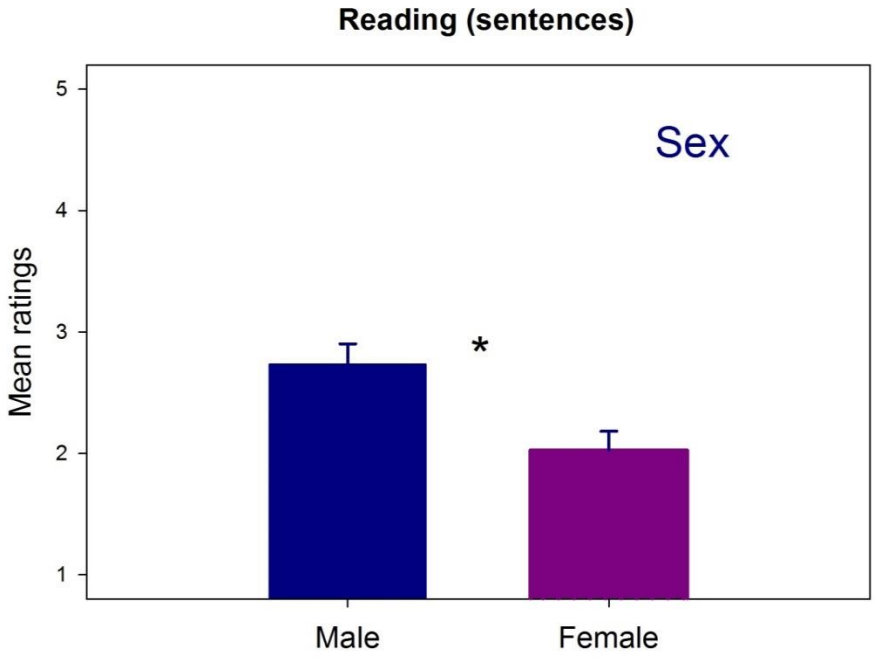

Figure 3.4. Mean ratings of /ai/ in read sentences as a function of speaker sex.

3. Spontaneous talks

Mean ratings for children's production of the /ai/ vowel in spontaneous talks, including stressed and unstressed exemplars of words in both voicing contexts (VL, VD) are displayed in Fig. 3.5. As can be seen, the differences between boys and girls were very small, and the overall pattern of ratings was similar for both sexes. Also, vowels in pre-voiceless contexts appeared to be more diphthongal than vowels in pre-voiced contexts, which is consistent with the previous results for sentences.

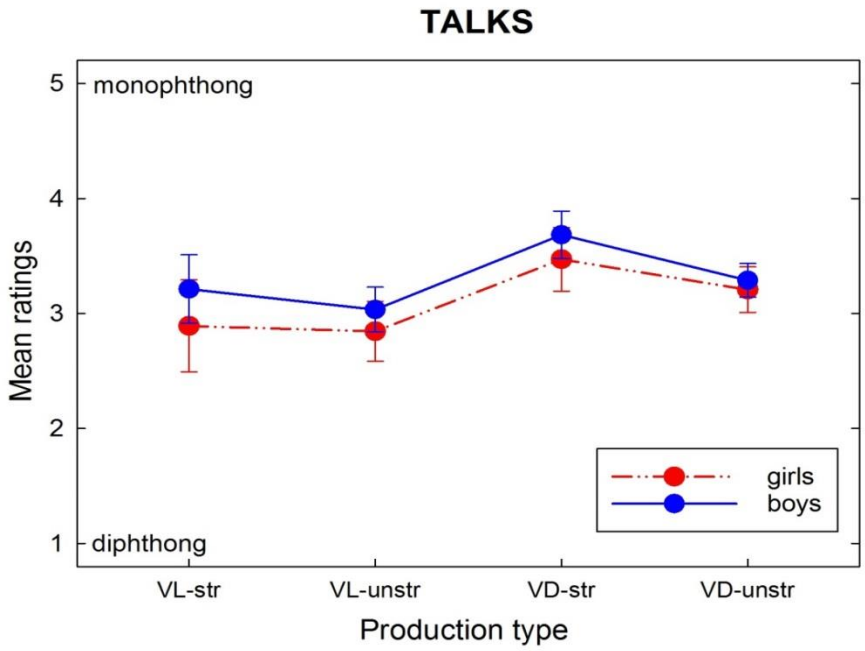

Figure 3.5. Mean ratings of /ai/ in spontaneous talks as a function of consonant voicing and stress. Ratings are displayed separately for boys and girls.

A repeated-measures ANOVA with the within-subject factors voicing and stress and the between-subject factor speaker sex was first used to analyze the ratings in spontaneous talks. Only the main effect of voicing was significant, [$F(1,12) = 9.47$, $p = .010$], indicating that vowels followed by a voiceless consonant were significantly more diphthongal than vowels followed by a voiced consonant (or no consonant in open-syllable words). No other main effects or interactions were significant.

A second ANOVA compared the ratings for talks with the ratings for sentences. In this analysis, only the vowels followed by a voiced consonant (or no consonant in open-syllable words) were included because vowels in pre-voiceless contexts were less frequent in children's speech. That is, speakers produced more instances of /ai/ in pre-voiced contexts (and in open-

syllable words such as “my”) than in pre-voiceless contexts, which occurred sporadically and predominantly in word “like” (see the stimulus material in Appendix B). In this ANOVA, condition (talks, sentences) and stress (stressed, unstressed) were the within-subject factors and speaker sex was included as a between-subject factor. Again, voicing was excluded as a factor and only vowels in pre-voiced (and open syllable) contexts in talks and vowels in the words “bides” in sentences were included in the analysis.

Two main effects were significant. There was a significant main effect of condition, illustrated in Fig. 3.6: Vowels in read sentences were significantly more diphthongal than vowels in spontaneous talks, [$F(1, 15) = 33.47$, $p < .001$]. There was also a significant main effect of speaker sex, shown in Fig. 3.7: Girls’ vowels were significantly more diphthongal than boys’ vowels, [$F(1, 15) = 6.35$, $p = .024$].

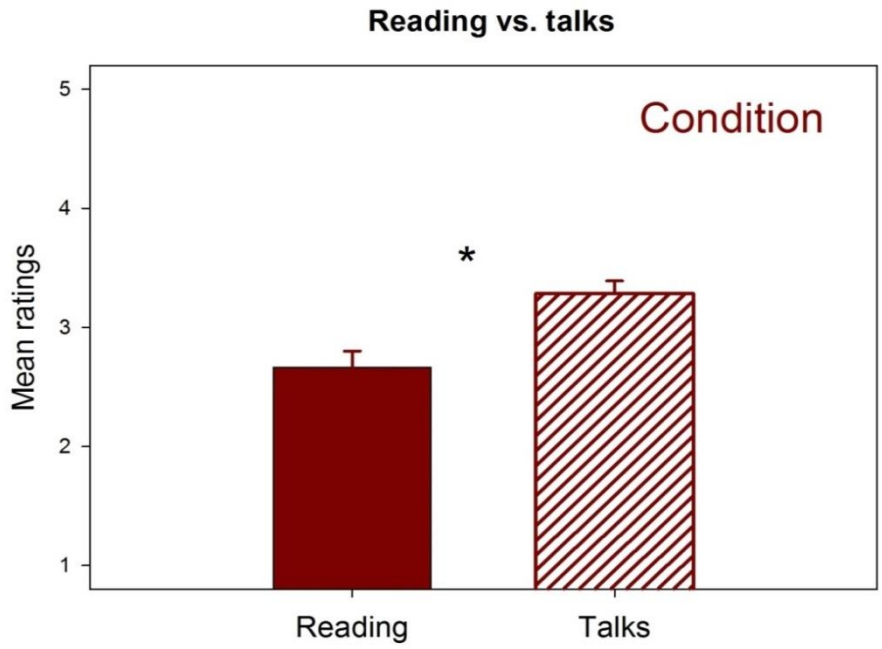

Figure 3.6. Mean ratings of /ai/ as a function of experimental condition (sentences vs. talks).

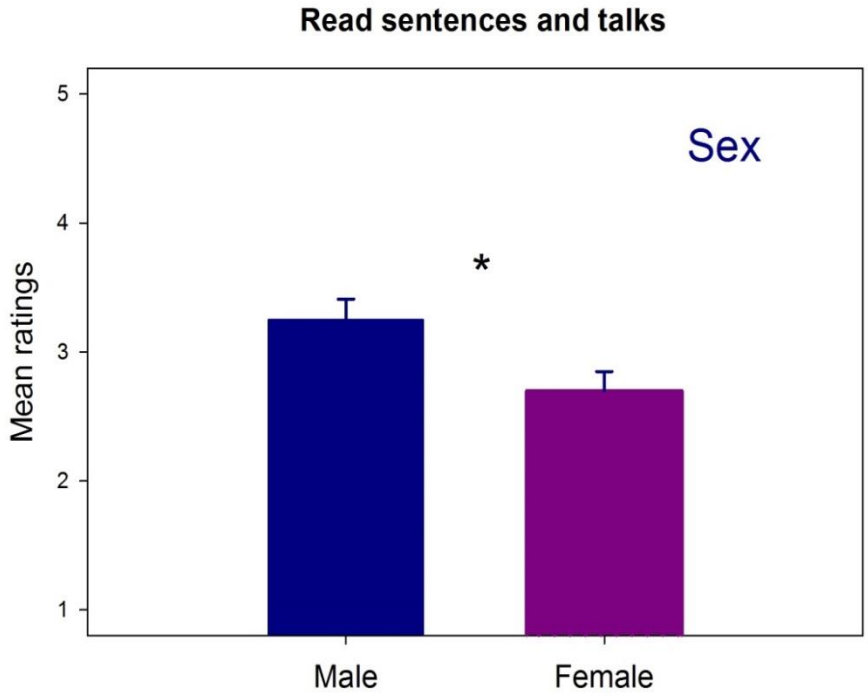

Figure 3.7. Mean ratings of /ai/ as a function of sex (sentences and talks combined).

An interaction between condition and stress was significant, [$F(1, 15) = 7.14$, $p = .017$]. The interaction, displayed in Fig 3.8, arose because stressed vowels in sentences were more diphthongal than unstressed vowels whereas this order was reversed for the vowels in talks. Given this reversal, the difference between stressed vowels in sentences and in talks ($M = -.872$) was greater than the difference between unstressed vowels in sentences and in talks ($M = -.389$). A paired *t*-test used as post hoc showed that these two differences were significantly different [$t(16) = -2.7$, $p = .016$]. This interaction indicates that there was a greater discrepancy in ratings of stressed vowels (in sentences and in talks) than of unstressed vowels. In read sentences, the stressed vowels were rated as more diphthongal relative to unstressed vowels whereas in talks, stressed vowels were rated as more monophthongal relative to unstressed vowels. There seems to be no plausible explanation for the reversed pattern in talks. Acoustic analysis of stimulus tokens in talks is currently unavailable and it is unclear if the unstressed vowels did in fact have more formant movement than the vowels selected as stressed.

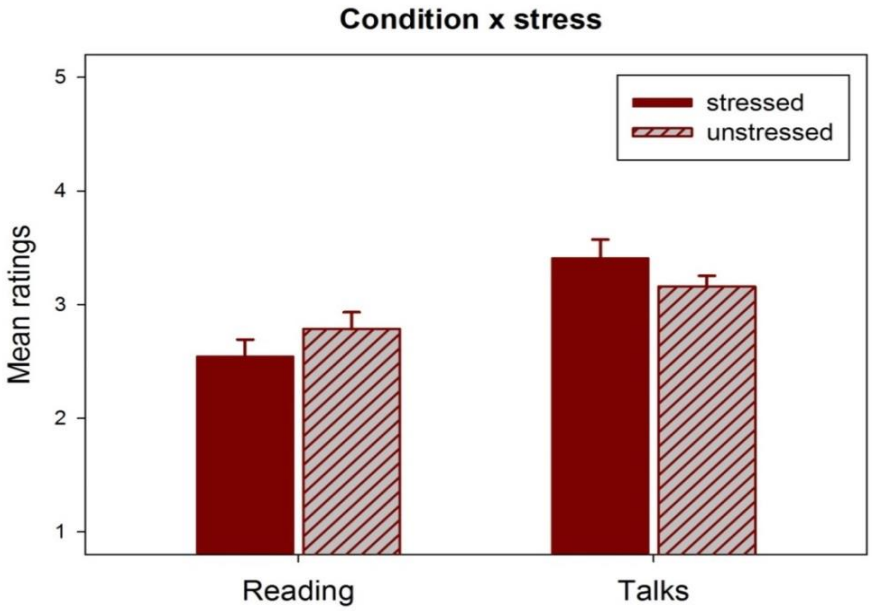

Figure 3.8. Significant interaction between experimental condition and stress.

Chapter 4

Discussion

The aim of this study was to better understand the appearance of socio-indexical patterns in children's speech and how these patterns are altered by their speaking style. The specific dialect feature examined here was the monophthongization of /ai/ in Southern American English, which is currently receding among younger generations, primarily in children and young adults. The study was designed to examine the sound change in progress and to determine whether and when children in this particular community in Inland South still conform to local norms by producing a monophthong or deviate from local norms by producing a diphthong.

Based on the existing research, it was predicted that children would produce the diphthongal variants most often in isolated words, followed by read sentences and spontaneous conversations, respectively. This is because each of these three respective styles represents a different level of formality and the less formal the style, the less careful the pronunciation (Labov, 2006). The results confirmed this prediction. The /ai/ vowel was perceived more often as a diphthong in read speech, primarily in isolated words, followed by words occurring in sentences. In less formal and unscripted talks, the vowel was perceived more often as a monophthong.

It was also predicted that the /ai/ vowel would be more diphthongal in stressed words and more monophthongal when the words were unstressed, both in read sentences and in spontaneous talks. This is because stressed words are associated with a more formal (and more careful) speaking style such as when emphasizing an important element in a discourse. This prediction was confirmed only for productions in sentences but not in the talks. In particular, the stressed instances of "bites" and "bides" were perceived more often as a diphthong and

unstressed instances of these words were perceived more as a monophthong. However, the reversed pattern was found in the talks, where the vowels in stressed words were perceived more often as monophthongs and in unstressed words more often as diphthongs. This curious pattern still awaits explanation in follow-up work.

Another prediction was that more diphthongal productions will occur in pre-voiceless consonant context such as in “bites” than in pre-voiced context such as in “bides” because children will most likely deviate from strictly local forms first in order to sound less old-fashioned. Historically, monophthongization in pre-voiceless contexts is more restricted in the South and appears to be used primarily by speakers from the Inland South, where data for the current study were collected (Labov et al., 2006; Wolfram and Christian, 1976). Thus, as predicted, the results showed that children indeed manifested more diphthongal productions in pre-voiceless contexts and more monophthongal productions in pre-voiced contexts.

Finally, the study provided evidence for gender differences in children’s stylistic variation and uses of non-standard variants of a local speech community. In line with known reports of the differences between men and women along selected variables in pronunciation patterns (Labov, 1990; 2002), the current results provide further evidence that boys use a higher frequency of local dialect forms than do girls. Moreover, in a situation when sound change is in progress such as the change from the monophthongal to the diphthongal variant of /ai/ examined here, women typically lead the sound change (Eckert, 2000; 2012; Cheshire, 2002). The current study found that this trend emerges already in childhood and that the differences between girls and boys reach statistical significance. Possibly, boys (and not girls) actually contribute to the maintenance of regional dialects by using the regional variants more frequently than girls as

suggested in a different study conducted with 10-11 year-old children in the French Alps (Barbu et al., 2014).

Conclusion

The current study contributes to a better understanding of acquisition of sociolinguistic patterns in childhood. In particular, it shows that school-age children are aware of subtle stylistic adjustments in speech and are capable of using style-shifting in predictable ways. The children from the Inland South were found to both conform to and deviate from local speech forms, using both standardized and localized forms of the /ai/ vowel in their speech. Their selection of a particular form in certain contexts reflects their implicit knowledge of and understanding of the social aspects of pronunciation and style shifting, specifically that they understand that diphthongal realizations of /ai/ are more appropriate in a formal style of speech and that monophthongal realizations are associated with casual productions. They also implicitly understand that words produced with greater emphasis are more formal and should have diphthongal realizations of vowels. Their use of varying forms in relation to the voicing of the consonant after the vowel indicates that children are aware that pre-voiceless monophthongization is associated with strictly local and old-fashioned forms and needs to be replaced with diphthongs, which represent more modern speech patterns. Finally, the significant gender-related differences confirm that females are leaders of language change and show that this tendency is already evident in school-age children.

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Appendix A

Stimuli from read sentences:

1. JANE thinks the small bites are deep. No, SUE thinks the small **bites** are deep.
2. SUE thinks the small bides are cute. No, JANE thinks the small **bides** are cute.
3. Sue KNOWS the small bites are deep. No, Sue THINKS the small **bites** are deep.
4. Jane KNOWS the small bides is cute. No, Jane THINKS the small **bides** are cute.
5. Sue thinks the LARGE bites are deep. No, Sue thinks the SMALL **bites** are deep.
6. Jane thinks the SHORT bides are cute. No, Jane thinks the TALL **bides** are cute.
7. Sue thinks the small CUTS are deep. No, Sue thinks the small **BITES** are deep. (x2)
8. Jane thinks the small CATS are cute. No, Jane thinks the small **BIDES** are cute. (x2)
9. Sue thinks the small bites are WIDE. No, Sue thinks the small **bites** are DEEP.
10. Jane thinks the small bides are GROSS. No, Jane thinks the small **bides** are CUTE.

Appendix B

Stimuli from spontaneous talks from the boys:

S3035:

1. I **like** to go **outside** and play basketball.
2. I **might** play soccer this year.
3. **My** grand, **my** other grandma that went to Charlotte to see her brother does.
4. I don't **like** tomatoes.
5. **I've tried** it before and I hadn't **like** it.
6. I **might** be in the band, the sixth grade band.

S3041:

1. The bids and **bides**, I kept getting' them mixed up.

2. Well, this, **like** at the beginning of this summer me and **my** brother and everybody we went like to the swimming' pool every day of the week…
3. But me and **my** papaw we like to go creek fishing' a lot up on Caney Fork…
4. …so he takes me up 'er fishing' a lot and **my** dad, he works for the state and **like** he's not on permanent yet, so he gets laid off one month out of the year…
5. On Caney Fork, oh, last time we went, we caught uh, **nine** rainbow and I caught one either brown or brook…
6. I can't remember but most of the **time** whenever we go, we go to the creeks that only have speckled trout in 'em.
7. … he takes me and my brother **sometimes** but I sort of like it better than my brother 'cause I'd rather creek fish than river or lake fish.
8. …but like there's one, uh, creek up there and you're, you're allowed to use **live** bait so we go to this old barn that's got bees nest in 'em…

S3047:

1. And we like, and papa likes to fix deer meat a lot and we love to go eat at Nanny's ever Friday **night**.
2. Uh, my mom, my dad, my sis – my two sisters, and **my** uncle, **my** granny and my papaw, my other uncle that lives with them and I got lots of family members but I just can't tell 'em all.
3. I **like** going' there a lot.
4. Um **sometimes** yeah, a lot with her.
5. I play, I like watching' **high** school games, going' to the high school games.
6. Well, we **lined** up first, we still had, we still had to **line** up on the, for kick off, we just held our helmets up and they went, "woo, oooo" and the clock was off and we run down the field.
7. And um, I **like** riding' four wheelers and dirt **bikes**.

S3048:

1. And me and **my** dad was deer hunting', we went down there, and I'd just now got **my** new gun and so we started deer hunting' and there was this deer come out.
2. Uh, you gotta start up there on its , way up there on its back hoofs and you gotta **kinda** cut around its legs and pull the **hide** down there and then start getting' the meat out.
3. Sitting' in the seat **beside** me.
4. … I had him for about a year and they went, they're, they're **kinda** black and tan and stuff and so one of 'em's got Lab in it.
5. And they took off up the road once and this old man wanted him and we went up there to get him and that old woman, his mom, **cried** because she wanted the dog.
6. She **liked** it too.
7. He, he's been, I had him for about a year and he's only about that tall since his mama's got Jack Russell in him, in her, so I guess, that's **why**.
8. He swims in the river a lot and he's **my** best friend.

S3057:

1. …I ran into a bush and a stick went through **my** leg and I had to have stitches and the stitches got infected and give me some more water please.
2. I had **ice** cream and I also had hush puppies.
3. And my dog is named Rowdy and he's brown and **white** and I think he has brown eyes.
4. Yeah, because the wind blows in my **eyes**.
5. He eats dirt - **sometimes**.
6. Well, one **time** mud got in his water bottle and, in his bottle thingy madingy and then he said, blah, but, dogs don't talk, and then he drank a little bit of it and then he hang his tongue out.
7. Let's see, I **like** to eat, and I also **like** to play.

8. I like to play with **my** dog and also like to, hmm, I also like to play with **my** step brothers and…

S3065:

1. If I'm really bored I'll just stand on my skateboard or jot something' down on paper or I **might** call my girlfriend - talk to her.
2. I like to **ride** dirt **bikes**, skateboard, you name it, I love it pretty much.
3. 'Cause coach said whenever you're in the fourth quarter, down by eighteen, you'll be glad that I ran you – 'cause if you're tired we're gonna lose and I said, "I don't care if we lose if I'm already **dyin'**."
4. You know - 'cause if you kill me you ain't gonna have a player, 'cause you only got six **guys** on my, oh yeah actually, six guys on our team, plus another kid who I think's gonna **sign** up because he didn't make our school's team.
5. Whenever I'm with **my** family I **like** to sit down and watch TV, I like to um, go out to dinner.
6. **My** little brother like to – I like to play football out in the yard with him cause I always win, you know it's like a huge advantage here, Here's him, here's me!
7. Well, she's flipped over and she's **like**, "Oh, guys help me!"

S3066:

1. Once when I was a little baby my mom was riding on her bike, with my dad on a trail, and uh, my mom, uh, my mom's **bike** tripped over something, she fell on something and my dad was like, "Mom don't move, you're on a snake!" and mom was **like**, "no, I'm not!" and Dad picked up the snake and threw it over the bank.
2. Uh, then he was **like** and then my mom was **like** [panting] and she was very freaked out.
3. I also play baseball and I **sometimes** like to play football.
4. I **sometimes** like to read but sometimes when I really want to get outside, I don't want to.

5. Well, **I** think the favorite book that I've read so far, and I haven't finished it yet, and I got, and one I not, another one that I'm still working on.
6. **I** like the BFG and uh, I like The Chronicles of Narnia which I'm still on.
7. Uh, I like the uh, some of the funny parts **like** when the giant **tries** to speak like when he says, uh, when he says, when he messes up his words and stuff.

S3069:

1. On the banjo I **like** Reuben and, uh, Home Sweet Home.
2. Uh, yeah I have to sing harmony with **my** mom and sister.
3. I took banjo lessons about two years from K.T. out of **Bryson** City.
4. For **five** years, er, when I was, when I was five.
5. He's left handed and he picks a **right** handed banjo **upside** down.
6. And Messer means **knife** in German.
7. Uh, my granny had seven brothers and sisters and **my** other grandpa had 13 brothers and sisters.
8. Uh, yeah, my mom sings but my sister don't hardly practice so she don't sing, but she sings **sometimes** and when we do practice we get in rows.
9. It's uh, we got about, uh, forty to fifty-five members and it's about thirty feet by twenty something.

S3075:

1. Play games and go **outside** 'n play.
2. And I like to play games with **my** sister when she's not mad at me.
3. Uh huh, uh, had a cat but it **died.**
4. They don't, they're not down **like** over here.
5. I like to go to Pigeon Forge a lot and I like to go there at Christmas **time** and see all the **lights** 'cause they have a lot of lights.

6. And one **time** we, me and **my** dad rode go-carts and I beat him at it.
7. **Life** is a Highway.
8. I **like** *Cars* the movie.

S3086:

1. One time we took, um, Cookie hunting' and she got lost and we had to leave her **overnight** and, um, she almost got killed…
2. And then my little dog, she ran off and we had to try to look for her and we found her um, up on my mountain next to **my** house - and um, she uh, she was **fine** and my other dog was **fine.**
3. Me, **my** dad, and my mom and my sister.
4. Unless its half time or **timeout.**
5. Um, we like to snowboard and ski and skate and skateboard, I **like** to skateboard and she likes to jump rope and **ride** motorcycles and I like to **ride** motorcycles.
6. You don't, you don't have, you can be, you have to be over **five.**

Stimuli from spontaneous talks from the girls:

S3091:

1. Um, I'm really happy because I get to have a three-day weekend and, um, also, I get to um, during this week we get to miss a couple days, uh, because of the **high** school.
2. Um, **I** also get to go on a eighth grade trip this year and um, I've raised up, actually 800$ in candy bar sales.
3. …we'll go through the Kitty Hawk and all the little **islands** out there and, I think that's gonna be really fun – especially to get to do it with my, my friends.
4. Well she, I have to clean my room and after supper me and Maleah have to help, uh, put up all our, our stuff and then we have to, you know, wash dishes, wash off the table and all that **kind** of stuff.

5. Because their parents are missionaries, and um, we earn badges and all kinds of things, and um, it's really fun and I also get to teach that class since **I'm** one of the oldest in that class.
6. We live probably **five** minutes away.
7. …all their family members still live in Florida and they're up here all alone except **besides** their, their friends and everything…
8. Uh, my grandmother usually, of - on my mom's side, my mom's mother, uh, she'll - she likes takin' me and Maleah shopping' and doing' all kinds of like creative things.
9. She says "why do you go out and buy things at Walmart when you can go to the Hospital Auxiliary and you can **buy** it for a fraction of the cost?"
10. She likes to take us out to Dillsboro and we spend the **night** with her a lot and we go to church together.

S3093:

1. Um, **I'm** in sixth grade.
2. Good, the basketball team's undefeated so far and in softball we went all the way undefeated and I made All Stars - and we couldn't face this one team, we lost every **time** we played 'em.
3. That's **why** we lost out of the state.
4. Uh, my mom's dad and mom are divorced and they both live here but one lives in **Clyde.**
5. I'm real close to **my** dad's mom and…
6. **I** don't really get to see my papaw that much.
7. We **sometimes** go to the mall, we go shopping or we'll just go, sometimes I'll come to her work with her and I'll help her do some stuff or we just stay around the house and clean.
8. Um, it just seems **like** fun dealing' with babies and all that.
9. Um, if she hears something' she keeps it in her **mind.**
10. We'll ask him all these questions, he'll be **like**, "Yeah, uh huh."

S3097:

1. And **my** sister always wanted me to make a three pointer and I keep making' three pointers so I'm really glad about that…
2. And, I really **like** to play basketball because it's a lot of fun…
3. I'm real excited about that and this week at school we got - only have to go two days just Tuesday and **Friday** and then Monday, Thurs, Wed, Wednesday and Thursday that's the only days we get to stay out and that's really **exciting**!
4. I don't really like music a lot, I don't **like** to sing a lot, but my mom wants me to and I like to play the guitar but I don't really know much about it.
5. …but really he actually spends more time with me **like** takin' me to basketball practices and um going' to games with me – but my whole family goes to all the games with me - and they really like to do that.
6. … so we all separate up and we only get to **like** really speak and talk a lot is in lunch and PE and recess and stuff.
7. Well, I, I really do like to talk, but when I'm around new people I'm **shy.**
8. …Tuesday, after school we go to **Bible** Club and we do a bunch about it and we like learn about Jesus and stuff and we read the Bible and we have a lot of fun doing' that and at school we just go to our **library** and they have uh, our church take - brings it there…

S3152:

1. They are about 10 weeks, **nine** or ten weeks years old, I mean weeks old.
2. Charlie **likes** to get on a chair and turn around and watch TV.
3. Oh, **I** got my kitten at this woman - kittens, at this woman's - named Melvina, and she lives at Sylva, North Carolina, and so do I.
4. And play sports, like, I don't know, um, at home I **like** to um, play tetherball and four square.

5. They're moving to **Bryson** City so I won't get to see them unless they come over here, so.
6. Yeah, I like, Dr. Pepper's **my** favorite soda.
7. Harry Potter and the Order of the Phoenix, um we stand in **line** at midnight and saw Harry Potter.
8. We standed at **line** at 10:30 and we got in about 12:00.
9. **I kinda** liked it.

S3153:

1. And he takes the bicycle- and the table was set up **like** a ramp and he goes and he's gonna jump it.
2. He gets ready, and gets in position and starts **riding** really fast and goes to jump and flips over and does not make it over the jump.
3. And we had just gotten **I-pods** at Christmas and he crushed his I-pod and injured himself very badly.
4. Yesterday I went to **Bryson** City with my cousin Mason and her mom Cindy.
5. So we get in the car to come home and we stop by Burger King to eat but on the way we stopped **by**, stopped at a red light and, her husband, Cindy's husband Chris was in the black truck beside us…
6. … Deedee is missing a whole thing of eyelashes on one side and only has one on the other **side.**
7. … my brother's name is Matthew and my sister's name is Angelica and Matthew's going into **high** school and he's 14 and I'm thirt - almost 13 and Angelica's almost 11…
8. We have a pond and we go swimming' in it quite often and then we have a tetherball so we play that a lot and my brother and me like to go **outside** and play catch all the time…
9. Yeah, they'd probably be a little bit taller than me if they stood on their **hind** legs.
10. I guess they get all excited like cats do over **mice** and stuff.

S3172:

1. I've learned six different notes and three or four different songs and I am going to volunteer at the nursing' home to play some songs in the **dining** room on Sunday morning and play at church.
2. It's in the, dust bowl uh, setting during that **time**, and people, um, would wake up with dust on their bed and they wouldn't be able to eat their food because there'd be dust on the plates…
3. Um, **my** brother is six, his name's Austin.
4. He goes to a reading, uh, teacher named Miss [XXXX] and every Tuesday **night** he'll bring home a game and he makes everybody sit on the floor in a circle and play it with him.
5. Um, I like coloring a lot and he **likes** drawing.
6. I'm going to **find** some stuff 'cause at school we're having Spirit Week.
7. …they have little poles and they're gonna fish out treats, um, from **behind** a cardboard wall looking' thing.
8. Oh yea, my brother said, he was writing a book the other **night** and he said nobody can cook spaghetti like my sissy and then, um, in his book he also wrote, nobody can snore like my daddy, and nobody can, let 's see, nobody can fuss like my uncle Isaac, nobody can fall asleep in a chair **like** my grandmother, nobody can fix a car like my papa…
9. Um, and since he's been using this certain paper he's started **writing** really good.

S3175:

1. And it, and last **night** she come to the football game and I got to see her and I said hello.
2. They're not very **bright,** but later on in the school year I have a pretty good grade av, grade average.
3. Umm, math is not **my** best subject but I like it every now and then.
4. And I got my last, er, last year whenever I wanted Miss Wallace as **my** homeroom, now I don't 'cause she's not the **nicest** person in the world.

5. So, it was like we were all in one space and it's like we're all scrunched up and trying to get around and sell and hold up **signs** and it was hard.
6. But when we first found out, main of, mainly all the girls, just, we're like sisters to her and she's **like** a sister to us and when we found out we couldn't, we couldn't hold it in we just all let it out.
7. All I know is that it has costumes and party **supplies** and everything else that involves partying.
8. It'd have to happen right then and right there in front of me for me to **like** do something about it.
9. I don't know how long it's been since I've held a little baby **like** 'at.

S3176:

1. Uh, my favorite subject in school is math and **writing** and I can't think of anything else.
2. Well, because she said she liked it and it was **kind** of her favorite and the best one.
3. Um, I'm gonna ask um, me and my uncle are going to um start making stuff for Halloween and start um, finding costumes for um me, and we might watch some TV…
4. …she said it took her about an hour and thir, and thirty something minutes just to get one um, of, just to get one worm **like** them fake – er – plastic ones, to get one of them sewed on there and one of them fake **spiders** but they cut off the ring part…it took um, her um, sister Diane **like** thirty minutes to put it on.
5. Um, yeah she used to make, um, rings for, um her granny for the pow wows and stuff like that and now she doesn't anymore because **sometimes**, cause now her granny doesn't go off to as much pow wows as she used to.
6. …we were going to buy something but my mom said, "No don't buy anything you **might** use up all our money."
7. And his tongue gets twisted up and **tied** up because he's allergic to cinnamon…
8. Um, ok, I forgot and I know my **nines**!

S3177:

1. Um, she **cries** if she does and she doesn't **like** watching' movies when horse have to die.
2. Um, we had a little party outside with uh, cookies and cupcakes and we had a candy bag and we had drinks and um, we played, um, **outside**.
3. She's exciting and she's wonderful um, and um, we had our program last **night** for the Dreams program and my aunt went and my un, my grandpa went.
4. I like to do, I like to ride my go cart and play with **my** dogs and I like to play the computer and watch TV.
5. …my other cousin, she's **kind** of loud and funny and silly at the same **time** and she likes to um, watch, um, Disney Channel and she likes to watch Cartoon Network…
6. Last year for Halloween I was McDonald's French **fries** and um, my cousin, she was supposed to be a McDonalds Big Mac, but she didn't put her costume on, so.
7. Stuff **like** 'at.
8. Me and my mom we made the salad last **night** and um we, I helped her and I had to wash the tomatoes and wash her vegetables…

S3182:

1. We went riding horses on Sunday and I got to **ride** our horse Cowboy and we got to ride, me and my friend Hannah, we got to ride in a carriage and we um, had a lot of fun.
2. Um, I had a sleepover with my friend Hannah and she stayed until from **Friday** all the way to Sunday evening.
3. …the dogs, we have one **blind** one and his name's Gizmo and the black and white dog is Misha…
4. It's a **type** of horse.
5. It's wood, it's wood and its black and it has **like** really old **timey** wheels on it too.

6. I’ve separated my collar bone, I have hyperextended my knee, I’ve bruised my [unintelligible] bone.
7. And they put a little red strip where the break is where she could always **like**, see.
8. …she’ll just stop and laugh at me; it’s like “God girl, how are you gonna ever **survive**!”
9. No, I’m not **shy**.